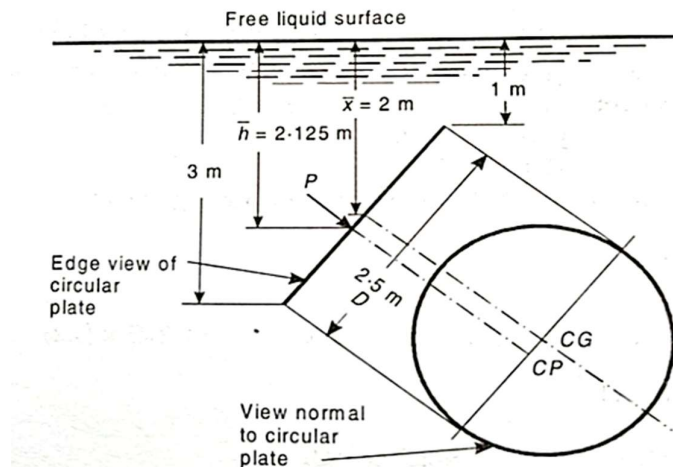


INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

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|--------|--|-----|------|
| Q.1(a) | Determine the dynamic viscosity (μ) of a fluid having the kinematic viscosity $\nu = 8$ stokes and specific gravity of 2.1. | [2] | 1 K1 |
| Q.1(b) | Two horizontal plates are placed 1.25 cm apart. The space between the plates are filled with an oil of viscosity $\mu = 14$ poise. Determine the shear stress (τ) in the oil if the upper plate is moved with a velocity of 2.5 m/s. | [3] | 1 K1 |
| Q.2(a) | Determine the surface tension in a soap bubble of diameter $d = 40$ mm when the inside pressure is 2.5 N/m^2 above the atmospheric pressure. | [2] | 1 K2 |
| Q.2(b) | State the Hydro-static law and define pressure head (Z). Determine the pressure due to a column of 0.3 m of (a) water, (b) an oil with specific gravity 0.8 and (c) mercury with specific gravity 13.6. Assume the density of water as 1000 kg/m^3 . | [3] | 1 K2 |
| Q.3(a) | A Block of Wood of Specific Gravity 0.7 floats in water. Determine the Meta centric height of the block if its size is $2 \text{ m} \times 1 \text{ m} \times 0.8 \text{ m}$. | [2] | 1 K2 |
| Q.3(b) | A circular plate 2.5 m diameter is immersed in water, its greatest and least depth below the free surface being 3 m and 1 m respectively. Find (a) hydrostatic force on one face of the plate and (b) the position of centre of pressure. | [3] | 1 K2 |



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|--------|--|-----|------|
| Q.4(a) | For the velocity components in a fluid flow given by $u = 2xy$, $v = a^2 + x^2 - y^2$ Show that the flow is possible. | [2] | 2 K1 |
| Q.4(b) | A pipeline is 15 cm in diameter and is at an elevation of 100.00 m at Section- A. At Section- B it is at an elevation of 107.00 m and has a diameter of 30 cm. When a discharge of 50 lit/s of water is passed through this pipe, the pressure at Section A is observed to be 30 kPa. Calculate the pressure at B when the flow is from A to B | [3] | 2 K2 |
| Q.5 | A vertical venturimeter 40 cm X 20 cm is provided in a vertical pipe to measure the flow of oil of having density = 0.8. The difference in elevations of the throat section and the entrance section is 1 m. The direction of flow being vertically upwards. The U tube differential manometer shows a reading of 40 cm. Determine the discharge through the pipe. Assume $C_d = 0.95$ | [5] | 2 K2 |